

**ANNUAL PROGRESS REPORT
TO
NORTH CAROLINA PEANUT GROWERS ASSOCIATION, INC.**

TITLE: Updating Fungicide Program Recommendations for Disease Management on High-Oleic Peanut Cultivars

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REPORT:

The objectives of this project are to:

- 1) Develop full or reduced disease management programs that are suitable for use on the high-oleic cultivars Sullivan and Wynne.
- 2) Incorporate more recently labeled products into tests of full and reduced management programs and compare net returns from management programs.
- 3) Evaluate efficacy of commonly used peanut fungicides by applying them in stand-alone season-long application programs.

Previously, we demonstrated that disease management programs originally developed for Bailey and Sugg also are suitable for use on Sullivan and Wynne. However, Wynne appeared to have less resistance to stem rot than Sullivan, Sugg or Bailey, suggesting that more intensive management may be needed on Wynne compared to the other cultivars. Also, several new fungicides have been labeled for use on peanut, but have not been evaluated for their fit with disease management programs on Sullivan and Wynne.

Disease management programs depend on the availability of fungicides that consistently provide high levels of disease control. However, county agents, consultants, and researchers reported poor leaf spot control in some locations in 2015 and 2016, suggesting that one or more fungicides may have lost efficacy against leaf spots. Loss of efficacy can be hard to document in fungicide trials or in typical grower fields because several different products typically are applied during the season. Thus, it is difficult to detect or identify an ineffective fungicide when it is used in a spray program that includes two or three other products. Likewise, it can be difficult to separate efficacy problems from effects of weather, delayed sprays, and possible application errors. These difficulties can be addressed by comparing fungicides in a uniform season-long application trial.

For objectives 1 and 2, one Full (5-spray) and three Reduced (4-spray) disease management programs were compared on Sullivan and Wynne at the Peanut Belt Research Station at Lewiston, NC and the Upper Coastal Plain Research Station at Rocky Mount, NC (Table 1). One of the Reduced programs included products that have been used for 15 years or more: Bravo, tebuconazole, and Headline. The Full and two of the Reduced programs included newer products: Elatus, Priaxor and/or Provost. The PBRs experiment also included an unsprayed treatment. The experiments were conducted on plots 4 rows wide x 38 feet long. The plots were arranged in a split-plot design with cultivars as whole plots, spray programs as subplots, and four replications. Plots at Lewiston received a single application of Omega 500 at 1.5 pt/A for control of Sclerotinia blight. No Omega application was necessary at Rocky Mount based on scouting and field history.

For the third objective, nine fungicides commonly used on peanut were applied three times at label rates to Bailey planted at Lewiston. Plots were 4 rows wide x 38 feet long and were arranged in a randomized complete block design.

Results, Objectives 1 and 2

Cultivars did not differ in disease or yield at either location and treatment effects were consistent across cultivars. Very little stem rot developed at either location. Sclerotinia blight incidence was moderate at Lewiston and very low at Rocky Mount.

Leaf spot pressure was extremely high at Lewiston (Table 2). Overall, leaf spot control was acceptable in the 5-spray and in the Reduced 3 (Teb+Bravo/Teb+Bravo/Headline) programs (Table 2). Leaf spot incidence was higher (40 to 50%) in the Reduced 1 (Elatus/Bravo/Priaxor) and Reduced 2 (Elatus/Provost/Priaxor) programs, but defoliation was low in all four programs. All programs resulted in high yields.

Leaf spot incidence was moderate to low at Rocky Mount (Table 3) and all treatments maintained excellent control of leaf spot (Table 2). Leaf spot incidence and defoliation were slightly higher and plant condition slightly lower in the Reduced 2 program compared to the others, but no differences in yield were observed among treatments.

Table 1. Fungicide programs tested on Sullivan and Wynne at Lewiston and Rocky Mount in 2017

Treatment	July 17	July 31	Aug. 15	Aug. 28	Sept. 11
Full	Bravo 1.5 pt	Elatus 7.3 oz	Provost 10.7 oz	Priaxor 8 oz	Bravo 1.5 pt
Reduced 1 - leaf spot emphasis	none	Elatus 7.3 oz	Bravo 1.5 pt	Priaxor 8 oz	Bravo 1.5 pt
Reduced 2 - stem rot emphasis	none	Elatus 7.3 oz	Provost 10.7 oz	Priaxor 8 oz	Bravo 1.5 pt
Reduced 3 - standard	none	Teb + Bravo	Teb + Bravo	Headline 6 oz	Bravo 1.5 pt
Untreated (PBRS only)	none	none	none	none	none

Table 2. Effects of fungicide programs on disease control and yield at Lewiston, NC in 2017

Treatment	Leaf spot		Defoliation		Plant Condition		Stem rot		Sclerotinia blight		Yield lb/A					
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD				
Full	23.1	c	7.2	7.0	a	2.3	75.0	a	10.7	2.1	4.5	12.8	5.4	5198	a	375
Reduced 1	41.3	b	14.5	11.4	a	7.1	65.0	ab	17.9	3.9	3.8	8.3	11.7	5110	a	337
Reduced 2	50.9	b	17.6	10.9	a	5.0	63.1	b	11.3	1.4	2.5	18.6	28.7	5178	a	481
Reduced 3	27.2	c	15.2	7.3	a	2.9	68.1	ab	12.5	3.8	3.8	19.8	19.3	5254	a	284
Untreated	96.6	a	6.9	71.5	b	19.2	3.0	c	2.1	5.4	5.9	35.8	23.5	3522	b	1167

Table 3. Effects of fungicide programs on disease control and yield at Rocky Mount, NC in 2017

Treatment	Leaf spot		Defoliation		Plant Condition		Stem rot		Sclerotinia blight		Yield lb/A				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD			
Full	1.9	b	1.1	6.3	ab	2.7	87.5	bc	4.6	0.0	0.0	0.3	0.5	6019	450
Reduced 1	2.9	b	1.9	5.8	ab	1.7	89.6	ab	5.0	0.0	0.0	0.1	0.4	5916	387
Reduced 2	9.4	a	8.7	7.5	a	3.3	85.6	c	4.2	0.0	0.0	0.4	0.7	5906	269
Reduced 3	1.3	b	0.7	5.4	b	0.7	90.0	a	5.3	0.9	2.5	1.6	2.8	5798	318

Results, Objective 3

Leaf spot pressure was extremely high, with an average of more than 90% defoliation observed in untreated controls (Table 4). Moderate to high levels of leaf spot also developed in fungicide-treated plots, in part because they were only sprayed only three times during the season. Treatments with the group 11 fungicides Abound and Headline did not reduce leaf spot compared to the untreated control. More than 20% defoliation was seen with Headline and Fontelis and more than 80% defoliation was found with Abound. Yield was reduced with Abound and to a lesser extent with Headline. Although Bravo provided excellent leaf spot control, yield was not correspondingly high. This probably can be attributed to the high incidence of Sclerotinia blight with Bravo.

Table 4. Effects of commonly used fungicides on leaf spot control at Lewiston in 2017

Treatment*	Leaf spot Mean \pm SD	Defoliation Mean \pm SD	Plant Condition Mean \pm SD	Stem rot Mean \pm SD	Sclerotinia blight Mean \pm SD	Yield lb/A Mean \pm SD
Bravo	31.5 fg 24.1	8.4 c 4.5	75.0 a 5.8	5.8 4.8	81.8 a 31.8	4277 c 45
Priaxor	40.6 ef 18.8	8.1 c 3.8	65.0 a 10.0	0.3 0.5	3.0 f 2.7	5105 a 254
Provost	19.0 g 5.6	8.4 c 1.2	48.8 b 16.5	11.8 15.8	48.0 bc 11.2	4665 abc 105
Elatus	65.0 cd 4.1	12.5 bc 8.7	40.0 b 0.0	0.0 0.0	12.8 def 12.0	4724 abc 418
Fontelis	53.8 de 28.2	28.0 bc 43.0	20.0 c 10.8	1.0 2.0	30.8 cde 18.4	4638 bc 807
Teb/Bravo	39.0 ef 21.2	8.6 c 6.0	66.3 a 14.9	3.3 4.6	30.3 cde 23.0	4866 ab 98
Headline	89.0 ab 14.6	23.8 bc 20.5	18.8 c 14.4	3.5 3.9	7.3 ef 1.7	4382 c 326
Abound	97.9 a 2.3	81.3 a 9.7	5.0 d 0.0	1.5 2.4	33.0 cd 13.6	3734 d 466
Omega	76.3 bc 11.8	19.0 bc 20.8	50.0 b 14.1	0.8 1.0	30.3 cde 30.1	4671 abc 378
none	99.0 a 0.0	92.5 a 2.0	5.3 d 3.7	8.5 10.0	65.3 ab 18.4	2161 e 657

* Rates: Bravo WeatherStik 1.5 pt/A; Priaxor 8 oz/A; Provost 10.7 oz/A; Elatus 7.3 oz/A; Fontelis 16 oz/A; Tebuconazole 7.2 oz/A; Headline 8 oz/A; Abound 12 oz/A; Omega 16 oz/A

Conclusions: The full spray program and the Reduced 3 program (Teb+Bravo/Teb+Bravo/Headline) provided excellent control of leaf spot on Sullivan and Wynne at both locations. The Reduced 1 and Reduced 2 programs provided somewhat less leaf spot control, but yield was not affected. Poor control of leaf spot with the group 11 fungicides Abound and Headline provides preliminary evidence that some late leaf spot populations may have developed insensitivity to these fungicides.

IMPACT STATEMENT

Peanut was grown on more than 115,000 acres in North Carolina in 2017, and produced an estimated yield of more than 4500 lb/A. Among other costs associated with disease management, fungicides represent approximately 12% of variable costs of production. Yield losses of 50% or more are expected if fungicides are not used. Growers typically can prevent yield losses in susceptible cultivars by applying fungicides five or more times per season. However, some growers have observed poor leaf spot control with products that formerly were highly effective when applied correctly, suggesting that some leaf spot populations have developed resistance to some fungicides.

This research demonstrated that growers can grow moderately resistant cultivars of peanut with four fungicide applications instead of five. In addition to the cost of the fungicide (average of about \$16/A), reducing the number of sprays saves labor, fuel for trips over the field, and environmental impacts of fungicide applications. This research also provided evidence that some fungicides may no longer be effective against leaf spot. If confirmed, fungicide resistance poses a serious threat to peanut yield and profitability.